following comments intelligible. Firstly, the demonstration of an essential and fundamental point, viz. the higher degree of blood-pressure in the area supplied by the left common carotid artery, leaves a good deal in the way of direct evidence to be desired: the most important point urged in support being perhaps the comparatively greater frequency of cerebral hæmorrhage on the left side. The author admits that, as regards the brain, the confluence of the two vertebral arteries (to form the basilar) equalises the conditions on the two sides so far as the parts (medulla, pons, and posterior parts of hemispheres) supplied by these are concerned, whereas the equalising effect is not supposed to be felt in other parts of the circle of Willis. We regret that we can find no direct guidance on this point in Hill's important work on the cerebral circulation.

The arrangement of the great vessels springing from the aortic arch is also a subject that admits of a good deal of discussion in the present connection.

With reference to the auditory nerve (p. 16), and the greater sensibility of the auditory centre in the left hemisphere, it may be mentioned that some support is afforded to this view by the earlier date at which the auditory fibres running up to the first temporal gyrus in the left hemisphere acquire their medulla, and presumably attain a fully functional state (Flechsig). In his observations on the eye, the author is to be congratulated on having devised new applications of routine clinical methods to the elucidation of the questions with which he deals. As regards actual differences in the dimensions of the eyes, it is remarkable that no evidence on this subject is forthcoming from the otherwise exhaustive work by L. Weiss on the anatomy of the eye (*Anatomische Hefte*, Bd. viii. 1897). The recognition of non-pathological differences in the size of the pupils is a point on which it is worth while to insist; moreover, the phenomenon will lose little, if any, of its importance as a physical sign in the early diagnosis of certain nervous diseases (*e.g.* general paralysis of the insane). As regards the weights of the hemispheres of the brain, it may be well to remark that there appears to be a mis-quotation on p. 49, where the weight of a left cerebral hemisphere is stated to be 218 gm., and that of the corresponding right hemisphere 133 gm. only; at any rate, if there is not a mistake in quoting Hamarberg's figures, the brain could hardly be regarded as other than pathological, and consequently valueless in this connection. But more important than this is the fact that Braune's extensive weighings show that the difference between the two hemispheres is quite negligible. At the same time we may mention that, according to Bastian, the specific gravity of the left hemisphere exceeds that of the right. Finally, we do not feel inclined to agree with the author in explaining instances of the existence of double personalities on the supposed presence of equal blood-pressure in right and left common carotid arteries.

On the whole, we think that while the amount of evidence in support of the author's main assumption might well be increased, at the same time the clear record of observations, and the deliberate discussion of their significance, will render Dr. Lueddeckens' volume of much interest to biologists.

W. L. H. DUCKWORTH.

MODERN VIEWS ON THE CHARACTERS OF THE CELLULAR ELEMENTS IN THE BLOOD.

Histology of the Blood: Normal and Pathological. By P. Ehrlich and A. Lazarus. Edited and translated by W. Myers, M.A., M.B., B.Sc. Pp. xiii + 216. (Cambridge: At the University Press, 1900.)

NOT much more than a year has elapsed since the first part of "die Anæmie," by Ehrlich and Lazarus, appeared in Nothnagel's "System of Pathology and Therapeutics"; but during that short time the work has taken a foremost place among those dealing with the histology of the blood. Perhaps the most striking feature of the book is its originality, broad lines being laid down along which future investigators may work, and no subject is taken up without being enriched by some suggestive hypothesis based on interesting observations made by Ehrlich himself or some of his pupils. Although comparatively a small book, it may be said, without disparagement to the many other works on hæmatology, to be the one to which the term "epoch-making" may, without exaggeration, be applied. It is only possible to refer shortly to some of the most important subjects discussed in its pages. Although it is undoubtedly with reference to the leucocytes that the most important observations are made, there are also points of great interest treated of in the chapter dealing with the morphology of the erythrocytes. This is especially the case with regard to the authors' views on polychromatophilia as a sign of degeneration, and on the method of transformation of megaloblasts to megalocytes and normoblasts to normocytes. Not less important are the paragraphs dealing with the megaloblastic type of the blood and marrow in pernicious anæmia. But it is when the authors come to discuss the normal and pathological histology of the white blood corpuscles that we find on every page observations that shed light on points that have been long in obscurity.

Although the authors belong to a comparatively small school that believes in the absolutely distinct characters of two types of white blood corpuscles, lymphocytes and granular leucocytes, yet no one, whatever his own opinions may be, can rise from a perusal of these pages without granting that no stronger case could have been presented in support of this view than the one placed before us in this book. Perhaps it is mainly to Ehrlich and Ribbert in Germany, and Muir in this country, that we are indebted for the most powerful arguments against the view that all leucocytes are developed from the lymphocyte. The arguments presented in this book in favour of the view that there are two great types of white cells, are obtained from morphological, experimental, pathological and clinical data. The morphological characters of the different forms of white cells are first described in a very lucid manner. There is an exceedingly valuable contribution to our knowledge of the functions of the spleen in Kurloff's work on the effects of removal of that organ from guinea-pigs. The functions of the lymph glands and bone marrow are described, and additional evidence is given in favour of the two-fold type of the white blood corpuscle.

The chapter dealing with the demonstration of the cell granules and their significance is, of course, one in which Ehrlich, as a pioneer in this subject, naturally finds him-

self at home. He repudiates Altmann's claims to priority with regard to the importance of cell granules. The description of the different types of leucocytosis and leucocythæmia is exceedingly good, and perhaps constitutes the most valuable section of the work. It is unfortunate that the translator has not seized the opportunity, as he has done in the case of Kanthack and Hardy's investigations, of referring to the very important work done by Muir on experimental leucocytoses and leucocythæmia. It is to him that we are indebted in the first place for the recognition of the "leucoblastic" type of marrow in experimental leucocytosis.

Ehrlich's chemiotactic theories with regard to the emigration of different cells from their seat of formation, the marrow, into the blood, and from the blood into the tissues, &c., are presented in a most interesting fashion, although, unfortunately, it is still impossible to speak about the etiology of medullary leucocythæmia in anything but the most indefinite way. To Dr. Myers' translation one can only refer in terms of praise. Perhaps it errs at places by being rather too literal. References to Jenner's eosin-methylene blue mixture, and to Kanthack and Hardy's work, are welcome additions made by the translator and editor. Confirmation and amplification of the very important investigations of Kanthack and Hardy, and Hardy alone, on the solution of oxyphil granules when cells containing the latter come in contact with chains of *B. anthracis*, &c., would be heartily welcomed by all who are interested in the subject of leucocyte secretions. T. H. MILROY.

BIOLOGY AT WOODS' HOLL, U.S.A.

Biological Lectures from the Marine Laboratory at Woods' Holl, U.S.A., for 1899. Pp. 282. (Boston: Ginn and Co., 1900.)

THE present volume, like all its predecessors, is replete with interest and full of testimony to the activity and good work of the Whitman School. It contains the reports of sixteen lectures, of which as many as four are for the first time botanical; and although among the zoological writers we miss the names of Whitman and one or two of the most tried among his earlier collaborateurs, the effects of their teaching and example are all evident. More especially is this the case with the lectures by C. M. Child on "The Significance of the Spiral Type of Cleavage," and by E. Thorndike on "Instinct," in which certain of Whitman's most famous conclusions receive support.

Conspicuous lectures are those by C. B. Davenport on "The Aims of the Quantitative Study of Variation," and by Jacques Loeb on "The Nature of the Process of Fertilisation," each in extension of work for which these investigators are now well known. The latter writer, dealing with facts which show that the process of fertilisation and development may be produced in the egg cell by the action of certain salts, to an advanced stage, would have us believe he has transferred the problem of fertilisation from the realm of morphology into the realm of physical chemistry. There is an important address by Alphæus Hyatt on "Some Governing Factors usually neglected in Biological Investigations," in which the uniformitarian hypothesis receives a check and a defence is set up of a law of "Tachygenesis" or "abbreviated development"; and there is incorporated in it a discussion on heredity, in its bearings on Ribot's argument that it is a "specific memory," and that a form of automatism is the link between memory and habit.

T. H. Morgan continues to write on "Regeneration," and among the lectures there are two which are noteworthy as embodying full bibliographies, of service for reference—viz. those by A. G. Mayer on "The Development of Colour in Moths and Butterflies," and by G. N. Calkins on "Nuclear Division in Protozoa." Interest amounting to novelty is greatest as concerns the work of C. H. Eigenmann on the breeding habits of the blind-fishes, the Amblyopsidæ, of the Mississippi Valley, in which the discovery that the bleached condition is assumed by the young even when reared in the light, is brought forward as evidence of hereditary establishment of an effect of the environment; and as concerning a lecture by H. S. Jennings on "The Behaviour of Unicellular Organisms," in which, from the fact that a multiplicity of causes may bring about similar reactions, it is argued that organisation and not the nature of the stimulus determines the result of experiment. Of the botanical lectures, that by D. H. Campbell on "The Evolution of the Sporophyte" furnishes an argument in favour of the abandonment of aquatic life having had a potent influence in its higher development, while another by D. P. Penhallow will be useful, as giving a succinct account of the alteration and carbonisation processes undergone by vegetable organisms during fossilisation. The remaining lectures are upon the effects of temperature and currents of air upon distribution, the significance of mycorrhizas, the associative processes in animals, and the "Physiology of Secretion"; and the *tout ensemble* gives promise of increased attention in the future to questions of cytology, in both their experimental and physiological aspects, with a leaning to those which involve philosophic principles and abstract ideas. No doubt much of the biological work of the next generation will be of this type, but in view of the probability that that may stand in danger of being overdone, and of the idea that nothing remains possible on the old lines, it may be said that in the very book under review there is reached the conclusion that "it is the individual which is the unit and not the cell." In the future, when everything will need to be gone over again under an advance in methods and a better understanding, the facts of mere anatomy—the value of which there is a growing tendency to depreciate—will assuredly prove as important and instructive as in the past. Our American brethren may do well to bear this in mind.

OUR BOOK SHELF.

Brief Guide to the Commoner Butterflies of the Northern United States and Canada. Being an Introduction to a Knowledge of their Life-histories. With Illustrations of all the Species. By Samuel Hubbard Scudder. Pp. xi + 210; 22 plates. (New York: Henry Holt and Co., 1899.)

OUR notice of the first edition of this work appeared in NATURE for August 10, 1893. This is not before us while writing; but as far as we can tell without actual comparison, the present edition, as regards the letter-